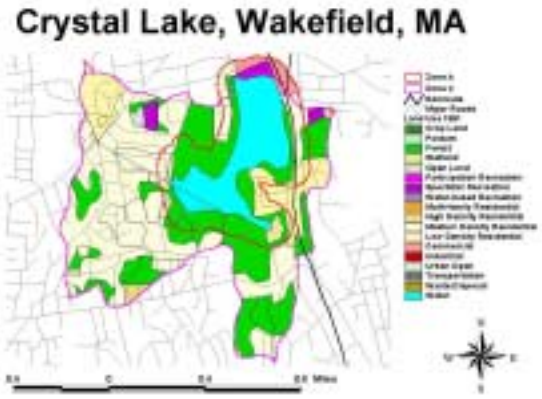
Crystal Lake Case Study

The Water Department of the Town of Wakefield, Massachusetts provides drinking water to about 25,000 people and it receives approximately 15 percent of its drinking water from Crystal Lake (with the remainder from the Massachusetts Water Resources Authority). Crystal Lake is located in the southwestern part of Wakefield, and its watershed encompasses about 600 acres in Wakefield and the neighboring Town of Stoneham. Currently, water withdrawn from Crystal Lake is filtered and treated with chlorine prior to entering the distribution system; no additional treatment process is in place to handle chemical contaminants or potential severe biological contamination events (for example, the inflow of raw sewage).

Within the Crystal Lake watershed, the dominant land use is characterized by medium density residential (that is, residential lots of between one-quarter to one-half acre). There are also small tracts of land with commercial and industrial activities. In addition, Crystal Lake is located next to an active railroad track and major roads. Two active sanitary sewer pump stations are located on the west side of the lake.



The Massachusetts Department of Environmental Protection (DEP) is funding a project under the State Source Water Assessment and Protection Program to protect Crystal Lake as a source of drinking water. As a part of this project, consultants have been selected to examine the management of stormwater inflow and sanitary sewer overflow entering Crystal Lake. The project team is currently conducting an in-depth study of the stormwater draining from various areas around the lake through some 12 stormwater discharge outlets. Some of the contributing areas may include areas outside both Zone A (400 feet from surface water supply) and Zone C (surface water supply watershed). The project team is also identifying associated stormwater catch basins and delineating the contributing areas for these catch basins using GPS technology. In addition, the project team is using GIS to extract and identify land use and potential contaminating activities located within the contributing areas. Finally, the project team will assess the relative risk associated with each of the catch basins and develop a prioritized list for the implementation of best management practices (BMPs) and other measures. Depending on the degree of risk, measures beyond BMPs (such as re-routing of stormwater) may be recommended to ensure the protection of Crystal Lake against contamination. The project will result in a better understanding of the stormwater problems and a strong basis upon which to target outreach activities. A round of outreach activities for local residents and businesses will be conducted to explain these issues and to promote better environmental management of stormwater.

Facilitator: Chi Ho Sham

Chi Ho Sham has 10 years of consulting experience, mainly for the U.S. Environmental Protection Agency in the areas of underground injection control, drinking water and ground water protection, and water quality analysis. Before joining the consulting field, Chi Ho was an Assistant Professor at the Boston University's Center for Energy and Environmental Studies from 1982 to 1991.

Over the past 10 years, Chi Ho has worked on a wide range of environmental projects including drinking water source assessment, ground water protection, underground injection control, and natural resource management. He has also worked extensively in implementing and developing GIS for environmental management and protection.

Chi Ho is currently a Vice President at The Cadmus Group, Inc., a firm that works extensively on drinking water issues at the federal, state, and local levels.

Chi Ho received his doctoral degree from the State University of New York at Buffalo in 1984 with a focus on hydrology and geographic information system applications.